

MOSSER'S BRIDGE

(Ontelaunee Creek Bridge)

Spanning Ontelaunee Creek at Legislative Route 39112

Lynnport Vicinity

Lehigh County

Pennsylvania

HAER No. PA-338

HAER
PA
39-LYNPO.V
1-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD

National Park Service

Northeast Region

Philadelphia Support Office

U.S. Custom House

200 Chestnut Street

Philadelphia, PA 19106

HISTORIC AMERICAN ENGINEERING RECORD
MOSSER'S BRIDGE
(ONTELAUNEE CREEK BRIDGE)

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PA
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1-

LOCATION: Spanning Ontelaunee Creek on Legislative Route 39112, Lynnport Vicinity, Lehigh County, Pennsylvania.

UTM: 18.428460.4500580
Quad: New Tripoli, Pennsylvania

DATE OF CONSTRUCTION: 1869-70; one span relocated to present site in 1900

PRESENT OWNER: Commonwealth of Pennsylvania, Pennsylvania Department of Transportation, Harrisburg, Pennsylvania

PRESENT USE: Not in service; closed 1987

SIGNIFICANCE: Mosser's Bridge is one of two bowstring arch-truss bridges remaining on state-owned highways and roads in Pennsylvania. It is distinguished by a variety of unusual features, including top chords fashioned from two Phoenix sections, a system of camber rods below the bottom chord which serve to deepen each truss and thereby limit deflection, and camber rods beneath each floor beam which reduce the lateral movement of the top chords under live loads. This single span was originally erected in 1869 as part of a two-span bowstring arch-truss which carried Main Street over Trout Creek in Slatington, Lehigh County, Pennsylvania. The ironwork was supplied by the Continental Bridge Company of Philadelphia, and erected under the supervision of local bridge contractor Daniel Beidelman. In 1900, this span was relocated to its present site by the Penn Bridge Company of Beaver Falls, Pennsylvania, where it served the transportation needs of the rural agricultural community in the Ontelaunee Creek valley.

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PROJECT INFORMATION:

Mosser's Bridge was recorded in July 1988 by Berger Burkavage, Inc., of Clarks Summit, Pennsylvania, for the Pennsylvania Department of Transportation, Harrisburg. The project team consisted of Martha H. Bowers, Architectural Historian; Rob Tucher, Photographer; and Ingrid Wuebber, Research Historian.

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DESCRIPTION

The subject of this documentation is a single-span bridge which carries Legislative Route (L.R.) 39112 over Ontelaunee Creek in Lynn Township, Lehigh County, Pennsylvania. Lynn Township occupies the extreme western portion of Lehigh County, and is bounded by portions of Schuylkill County to the north and Berks County to the west. The area is predominantly rural, characterized by dispersed farmsteads and small villages, the nearest of which is Wanamakers, located on State Route (S.R.) 143 less than one mile from the bridge. L.R. 39112 is a gravel road which extends east off Route 143 and, for most of its approximately 5-mile length, follows a northeasterly course along the south bank of Ontelaunee Creek. Route 143, lying above the north bank, is the principal route through this area from U.S. 22/78 to Lynnport and New Tripoli. Along the north bank of Ontelaunee Creek is Township Road 746, which extends south from Wanamakers and ends at L.R. 39112 just before the latter crosses the creek. The only buildings in the immediate vicinity of Mosser's Bridge are a nineteenth-century stone farmhouse and several agricultural outbuildings, formerly part of the Mosser farm from which the bridge derived its original name. These are situated on the east side of the creek, at the point where L.R. 39112 makes a sharp curve to the north off the east end of the bridge. The banks of Ontelaunee Creek are heavily wooded.

Mosser's Bridge is a single-span pony bowstring arch-truss. It has a 90 degree skew and is seated on coursed rubble ashlar abutments. The approaches are formed by stone wing walls which rise to the level of the roadway and are fitted with pipe railings. The bridge is 92'4" long (end shoe to end shoe) with each truss subdivided into eight panels. Each of the end panels is 10'2" long, the remainder 12'0" wide. The span carries a wood plank deck with a 15' clear roadway between 4" x 4" timber wheel guards. The top chords are fashioned from two 7 15/16" x 5/16" cast Phoenix sections, between which is riveted a stem plate 11 1/4" x 5/16". Stiffening bars, 2" wide and 5/16" thick, are inserted horizontally through the stem plate at regular intervals and are riveted to the outer flanges of the Phoenix sections.

The bottom chords consist of pairs of flat bars 4 3/4" x 1/2" with turnbuckles, on which rest the I-beam floor beams which carry I-beam stringers on which the flooring is laid. The vertical posts of each truss consist of pairs of T-bars 3" x 2 1/2" x 1/2" which by means of flanges at the bottom are riveted to the upper flange of each floor beam. The T-bars are joined to the top chord by means of plates riveted perpendicular to each side of the stem

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plate; in order to allow the stem of the T-bar to be riveted to the plate, a small section of the "head" of each T is cut away. Within each panel are flat vertical members, 2" x 5/16", placed approximately 2 feet apart. At the top, they are riveted to alternate sides of the stem plate; the bottom ends are inserted between the parallel bars of the lower chord and riveted in place.

To the lower flanges at the outer ends of each floor beam are riveted vertical plates, or shoes, of cast iron (the largest of which is approximately 2' wide and 1' 10" deep), through which the bottom chord passes. The web of each plate provides the bottom anchorage for diagonal rods with turnbuckles, which at the top are flattened and riveted to the stem plate of the top chord. The lower edge of each vertical plate features two niches or saddles, into which fit parallel camber rods of 1 3/4" diameter, with turnbuckles. Each pair of camber rods is bolted, at the outer ends, to an anchor plate seated behind each end shoe of the trusses. The inner ends of each pair of rods are bolted to 4-foot-long connecting plates, which in turn are bolted to either side of the bottom chord at the center of each truss. Between each pair of camber rods is a third rod of similar diameter. Each of these "third" rods extends only across the outer three panels of each truss; each rod is bolted at the inner end to the vertical plate at L3, and at the outer ends flattened and inserted between the bars of the bottom chord between L0 and L1, near the end shoe, where it is riveted in place.

There are two types of bottom bracing. Beneath each floor beam, except that at L4, is a pair of 7/8" camber rods with eyes at the outer ends, through which a pin is inserted to hold them against a plate riveted to the top of the floor beam between the legs of the vertical posts. Beneath the center of each floor beam is suspended a camber shoe to which the other end of each rod is bolted. Between each pair of floor beams, lateral bracing consists of four 3/4" rods which come together at the center at a circular cast-iron ring into which each is bolted. Each rod extends from the ring diagonally to the outer ends of a floor beam, where it is hooked into an "eye" riveted to the beam web.

In a bowstring arch-truss, the deck is suspended from the top chord, thereby placing all verticals in tension. The bottom chord is also in tension, as a result of the horizontal thrust exerted by the arched top chord. When a load passes over the bridge, the load is conveyed to the vertical posts. As the posts are placed in greater tension, the segment of top chord between the two posts is placed in compression. The flat verticals between posts of Mosser's Bridge thus appear to have been installed in order to counteract the tendency of a given arched segment of the top chord

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to buckle upward under the force of the added compression. This problem would be less likely to occur if the arch was formed from straight segments, or, perhaps, if the arch was fully tubular, with four, rather than only two, Phoenix sections. (The Phoenix column was patented in 1862 by Samuel J. Reeves and manufactured through the remainder of the century by the Phoenix Bridge Company of Phoenixville, Pennsylvania. It consisted of four cast members, riveted together to form a cylindrical column, and was normally used as a compression member. Although the Phoenix Bridge Company is most closely associated with the use of the column, it was also purchased for use by other bridge companies in patented designs of their own making.)

The trusses of Mosser's Bridge are rather shallow; i.e., the ratio between the maximum truss depth (approximately 8 feet) and the overall length (92 feet) is only about 1:11. Due to the arch configuration, the outer ends of the trusses are considerably shallower, a condition which increases deflection and vibration under live loads. Placement of the camber rods below the bottom chord has the effect of deepening the truss (by increasing the ratio of span to truss depth at the quarter points). This configuration of camber rods, vertical plates, and bottom chord essentially forms inverted king posts which help to limit deflection of the truss when a load is on the outer ends of the bridge. This configuration is repeated below the floor beams, which, with their 9-inch webs, are relatively shallow for their 21-foot length. Placement of the camber rods below each beam, again in a king-post configuration, would counteract the tendency of the floor beams to sag at the center, thus reducing the lateral movement of the upper chords under live load.

Mosser's Bridge is one of two pony bowstring arch-trusses recorded in an inventory of state-owned highway bridges conducted in 1982-1985 by the Pennsylvania Department of Transportation and the Pennsylvania Historical and Museum Commission (Commonwealth of Pennsylvania 1986:98). The first patent for a bowstring arch-truss was acquired by Squire Whipple in 1840 (Comp and Jackson 1977). Subsequently, the type achieved wide popularity for small vehicular crossings due to its relative "efficiency." Efficiency in this instance was associated with the goal of obtaining a comparatively strong structure with a relatively small amount of material (and thus lesser cost). However, bridge engineers were perpetually confronted with the problem of building a structure that was not only light and strong, but also sufficiently rigid. From the mid-nineteenth century on, many patents were issued for bowstring truss designs, and even more applications made, as engineers of varying training, experience, and competence attempted to develop bowstring trusses that would perform as required and at

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the same time be competitive in price (see, for example, Simmons 1985). In this regard, Mosser's Bridge may be interpreted as a highly individualized, "vernacular" example of bowstring arch-truss design.

The trusses of Mosser's Bridge originally constituted one span of a two-span structure built in 1869 over Trout Creek in Slatington, Pennsylvania. When one of the spans was moved to Ontelaunee Creek in 1900, it is possible that the wooden deck would have been replaced with new material, but it is unlikely that the trusses themselves would have required alteration to accommodate the span's new location. New abutments, of course, were constructed at Ontelaunee Creek in order to support the span over the stream. See the next section of this report for further information.

HISTORY OF MOSSER'S BRIDGE

Mosser's Bridge was originally erected in 1869 over Trout Creek in Slatington, in extreme northeast Lehigh County. The area of Slatington was initially settled in the 1730s, when Nicholas Kern, a German immigrant, acquired 500 acres along Trout Creek and the Lehigh River. Kern established a gristmill and a sawmill on Trout Creek, but he and his descendants remained almost the only permanent inhabitants of the area through the remainder of the century. In 1844, however, extensive deposits of slate were discovered by Owen Jones, William Roberts, and Nelson Labar on and near the Kern holdings. The Tunnel Quarry was opened in 1845, to extract slate for roofing shingles. In 1847, Jones and Robert McDowell opened a school-slate factory under the name Owen Jones and Company. Within four years, a town was laid out, called Waverly, and the area soon emerged as the largest supplier of slate in the state, producing roofing slate, school slates, blackboards, structural slate, and sink tops. In 1856, the Lehigh Valley Railroad was opened along the Lehigh River to the growing industrial village, by then known as "Liberty." By 1860 the community had a population of 500, and in 1864 it was incorporated as Slatington Borough. By 1869 the population had quadrupled, bringing the number to 2,000 (Mathews and Hungerford 1884:556-559; Slatington Centennial Association 1964).

The first bridge on Main Street over Trout Creek was a stone structure which had been erected in 1826. In March 1869, the Lehigh County Commissioners decided to look into the issue of its replacement (Lehigh County Commissioners' Minutes [hereinafter cited as "LCCM"] March 1, 1869). This issue appears to have been raised as a result of the decision of the Lehigh Valley Railroad to construct a "Slatedale" branch along the south bank of Trout Creek to the main line, to service the area's slate quarries and industries (Mathews and Hungerford 1884:561, 565).

In October 1869, the County Commissioners reviewed four bids for a new bridge from one Daniel Beidelman, described as a "bridge contractor." Each of Beidelman's proposals was for a bridge of two spans, each 91 feet long, the costs of which varied according to the type of lumber to be used in the flooring. The Commissioners selected the fourth proposal, which called for "seven Phoenixville iron floor beams in each span, 9" x 3", with white oak flooring," the total cost to be \$6163 (LCCM October 18, 1869). The ironwork for the two spans was supplied, for \$1500, by the Continental Bridge Company of Philadelphia, which around that time was marketing "wrought iron arch bridges," the arches of which were specifically described as being formed from "Phoenix column iron" (Order No. 1781, "on account of Slatington Bridge," in LCCM March

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21, 1870; Darnell 1984:61). In April 1870, the Commissioners appointed a team of "viewers" to inspect the bridge and report on whether it had been constructed according to contract (LCCM April 20, 1870). As no further mention of the bridge occurs in the Commissioners' Minutes, it may be assumed that the structure did indeed meet the terms under which it had been built. The new Main Street bridge, a two-span pony bowstring arch-truss, was erected on high stone piers and abutments sufficiently high for the railroad line, which formally opened in 1870, to pass beneath (Mathews and Hungerford 1884:561, 565; Slatington Centennial Association 1964). An 1899 photograph (included in this documentation as photo PA- -13) shows all of the west span (over the rail line) and a small part of the east span (over Trout Creek). An interesting feature of the west span, as shown on the photograph, was the stone pier which supported the center of the span. Whether this unusual feature was part of the original construction, or was installed later to correct a perceived deficiency, is unknown.

The arch-truss bridge served as intended for three decades. In 1900, however, viewers on behalf of the Lehigh County Commissioners recommended replacement of the structure, which apparently suffered from "weakened beams caused by smoking engines" passing beneath the west span (a situation which might have earlier led to erection of the pier to support the center of the span) (Slatington Centennial Association 1964; LCCM July 23, 1900). Although the Borough of Slatington could not mount the cost of a replacement on its own, it was aided by the Allentown and Slatington Street Railway Company, which offered to pay one-third of the full cost of a new bridge in exchange for permission to run its line across it. This course of action was approved by the Commissioners on July 23, 1900 (LCCM July 23, 1900).

An invitation for bids for a new Main Street bridge was issued on August 9, 1900. Potential bidders were invited to submit "their own designs with complete specifications" (LCCM August 9, 1900). Although the bids were opened, as advertised, on August 21, no contract was awarded. Four bidders had submitted plans and estimates: the Groton Bridge Company of Groton, New York, one plan for \$32,100; the Penn Bridge Company of Beaver Falls, Pennsylvania, one plan for \$30,800; George Shoemaker (no location given), one plan and two estimates (for \$15,000 and \$30,000); and Nelson and Buchanan of Chambersburg, Pennsylvania, no fewer than six different plans and quotes ranging from \$22,490 to \$26,491 (LCCM August 21, 1900).

One week later, the County Commissioners advertised for bids once again, this time providing their own estimates (\$17,000 for

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superstructure, \$10,000 for substructure) for a span 212 feet long, 40 feet wide, with a railroad track (with a stone floor). On September 3, the second round of bids was opened. Bidders this time were the King Bridge Company of Cleveland, Ohio (with 3 estimates), Penn Bridge Company (2 estimates), Groton Bridge Company (2 estimates), Oswego Bridge Company of Oswego, New York (1 estimate), and Nelson and Buchanan (4 estimates). Of these, the bids of the King and Groton companies were the lowest and that of Oswego by far the highest (LCCM August 27, 1900; LCCM September 3, 1900).

During this same period of 1900, the Lehigh County Commissioners had been planning the erection of a new bridge over Ontelaunee Creek near William Mosser's farm, in rural Lynn Township (LCCM April 10, 1900). Lynn Township, on the opposite end of the county from Slatington, was a predominantly rural agricultural area which had been set off from adjacent Heidelberg Township in 1753 (Mathews and Hungerford 1884:297). The Ontelaunee Creek valley extended east-west across the northern portion of the township, between the Blue Mountains and Shockary Ridge. The principal route through the valley (now Route 143) lay north of the creek, roughly following its course. This road was one of three extensions of the King's Highway, or public road, which had been established in the eighteenth century to enable area farmers to transport their produce to Philadelphia via Kempton (Roberts et al. 1914:821). In the early decades of the nineteenth century, several villages grew up along the road: New Tripoli, Lynnport, Jacksonville, and Steinsville (Mathews and Hungerford 1884:307, 311-313). Early industry in the township was associated with agriculture--for example, gristmills, sawmills, and small wool carding and stocking mills. Slate deposits began to be exploited in the township in the 1840s, leading to the establishment of several mantel factories (Mathews and Hungerford 1884:311, 313). The Berks and Lehigh Railroad was built through the valley in 1874, increasing the ability of farmers and local manufacturers to market their produce and products (Mathews and Hungerford 1884:311).

The area south of Ontelaunee Creek was occupied primarily by farmers, whose farmsteads were dispersed along the north flank of Shockary Ridge. A network of small roads developed, including one following the south bank of Ontelaunee Creek (corresponding to Legislative Route 39112 today), from which other roads extended south to Kistler Valley on the other side of Shockary Ridge (see Davis 1874). Since the main road, railroad, and commercial centers lay north of Ontelaunee Creek, it was inevitable that many crossings of the creek would be established over time. By 1874, no fewer than 10 roads crossed the creek between the township line (beginning with the crossing at Mosser's farm) east to New Tripoli

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(Davis 1874). Although each crossing, individually, was likely to service only very limited, local traffic, together these crossings formed an important element in the rural transportation system, a fact which their rural "constituents" were likely to bring to the attention of the County Commissioners on a regular basis. The importance of these crossings extended through the nineteenth and into the twentieth century: between 1892 and 1918, the county arranged for the erection of new bridges at five locations over Ontelaunee Creek ("County and Inter-County Bridges, January 1, 1933," manuscript Bridge Records, Lehigh County Historical Society). Thus, the decision of the County Commissioners to erect a new bridge on Ontelaunee Creek at Mosser's farm was a representative response to the needs and wishes of the Ontelaunee Valley agricultural community.

On August 27, 1900, the same day bids for Slatington's Main Street bridge were resolicited, the Commissioners opened proposals submitted for masonry and for ironwork at Mosser's on Ontelaunee Creek. The stone masonry contract went to Jacob Sechler of Lynn Township, the lower of two bidders; however, none of the quotes from five firms (King Bridge Co.; the Wrought Iron Bridge Co. of Canton, Ohio; Massilon Bridge Co. of Massilon, Ohio; Phoenixville Bridge Works of Philadelphia; or Harry Cooper [location unspecified]) were chosen (LCCM August 27, 1900). The following day, the County Engineer, George T. Oplinger, provided the Commissioners with an estimate for Mosser's Bridge over Ontelaunee Creek: \$1000 for masonry and \$2200 for a superstructure (LCCM August 29, 1900).

With the latter figure in mind, the Commissioners reviewed the second round of bids for Slatington's Main Street bridge. The Penn Bridge Company's lower bid was for \$15,995, \$1720 higher than the lowest figure, \$14,275, which had been submitted by the King Bridge Company. However, the Penn Bridge Company's offer also included a proposal to remove and relocate one of the existing Main Street arch-truss spans "anywhere in the County" the Commissioners might wish, for an additional charge of only \$325. Unable to resist the offer, the County Commissioners awarded the Main Street bridge contract to the Penn Bridge Company (LCCM September 3, 1900; LCCM September 4, 1900).

The separate contract, for relocation of one of the arch-truss spans to Ontelaunee Creek opposite Mosser's farm, was signed on September 7, 1900 (Agreement, Penn Bridge Co., Mosser's Bridge, dated September 7, 1900, in Bridge Records, Lehigh County Historical Society). The abutments and wingwalls were completed by Jacob Sechler, of Lynn Township, to plans and specifications developed by County Engineer George Oplinger ("Plans and

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Specifications for Mosser's Bridge, Lynn, Masonry Work," Bridge Records, Lehigh County Historical Society)(see copy of plan included in this documentation as photograph PA- -14).

Neither the plans nor specifications given to Sechler included construction of a pier to support the center of the relocated arch-truss. By 1914, however, a pier had been erected beneath the center of the span, replicating the earlier attempt, when the

bridge was still at Slatington, to support the trusses from below (Roberts et al. 1914:820). This feature was remarked upon in 1932, soon after the bridge had been brought under the jurisdiction of the State Department of Transportation. To the consternation of engineer H.C. Roeder, the bridge was "in dangerous condition due to some-one building up supports under [the] bottom chord at [the] middle of the span and consequently reversing all the stresses in the top chord and web members." Specifically cited were the "hangar rods from top to bottom chord" (presumably the flat vertical members) which were bent from "taking compression instead of tension" as a result of being propped up from below. Roeder's plan to repair the damage included removal of the center pier, and letting "traffic try and straighten [the bent members] out over the winter. If they do not straighten out by next summer, they will be re-riveted," a course of action which did, in the end, appear to have been required for several of the damaged members ("Wanamakers Bridge Over Ontelaunee Creek," manuscript dated 7/8/32-1935, in Bridge Records, Lehigh County Historical Society). The span remained in service until 1986, although its original state posting of five tons was reduced to four in 1968 (Commonwealth of Pennsylvania, Department of Highways, Iron-Steel or Timber Bridge Record, on file at District 2-0, Pennsylvania Department of Transportation, Clearfield).

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